# How to

## Differentiate Dutch Elm Disease From Elm Phloem Necrosis

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Dutch elm disease (DED) and elm phloem necrosis are the two most serious diseases of elm in the United States (Figs. 1 and 2). Most native species of elm are susceptible to both diseases. Dutch elm disease is caused by a fungus, *Ceratocystis u1mi* (Buisman) C. Moreau, and is transmitted by two species of elm bark beetles-the smaller European elm bark beetle, *Scolytus multistriatus* (Marsham) and the native elm bark beetle, *Hylurgopinus rufipes* (Eichoff). Elm phloem necrosis is caused by a mycoplasma-like organism and is transmitted by the whitebanded elm leafhopper *Scaphoideus luteolus* Van Duzee (Fig. 3). Both diseases also can be transmitted through root grafts between adjacent trees.

**Figure 3.** Nymph of whitebanded leafhopper, vector of elm phloem necrosis.

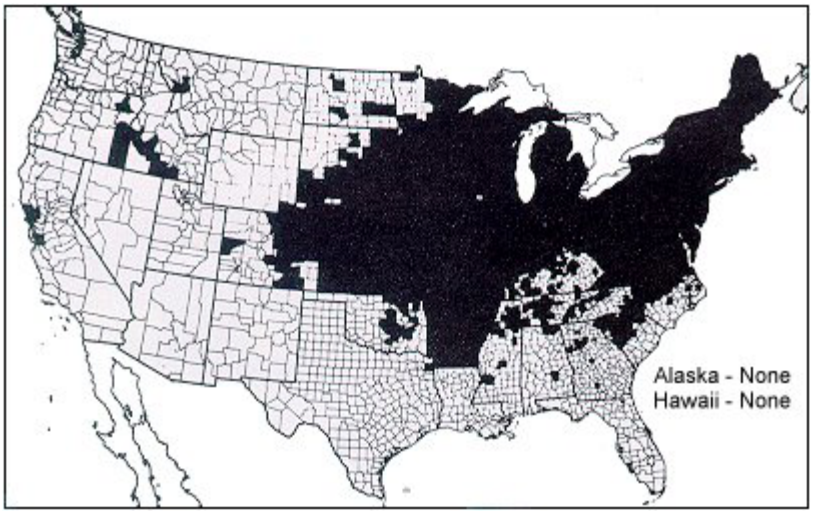


**Figure 1.** Distribution of Dutch elm disease in the United States (1978).

The impact of DED losses in urban areas has resulted in an increased emphasis on the use of surveys for early detection and on the prompt removal of diseased trees. Control of both DED and elm phloem necrosis requires early diagnosis and appropriate action. This leaflet is designed to assist in the field identification of these two serious diseases of elm.

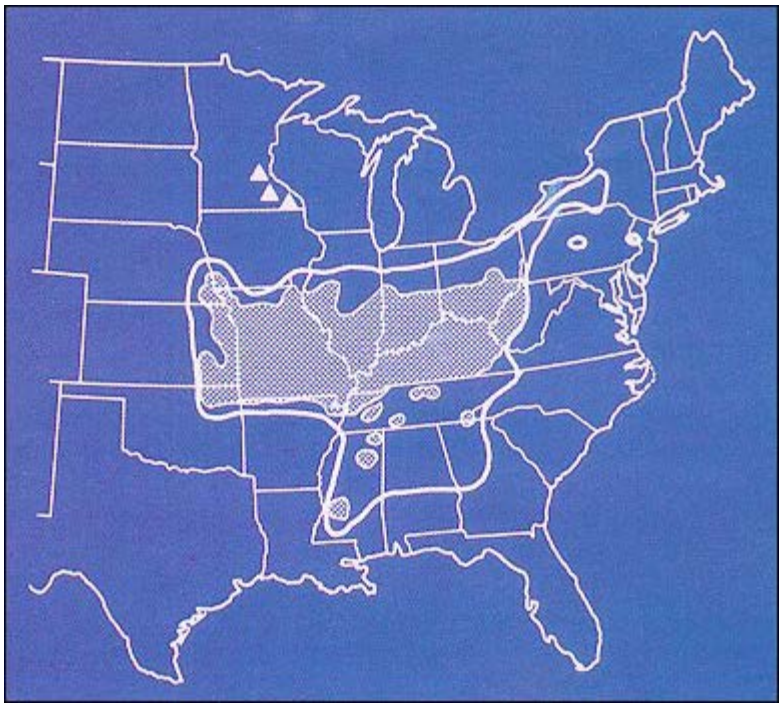

**Figure 2.** Distribution of elm phloem necrosis in the United States. Shaded areas show distribution in 1945; area within heavy line is 1975 distribution. Triangles indicate isolated cases.

## Field Symptoms

### General

**Dutch Elm Disease.** Usually, one or several small branches in the upper crown show earlier symptoms caused by beetle related infections (Fig. 4). Root graft infections usually show first in the lower crown on the side nearest the root graft (cover). Symptoms may appear anytime during growing season.

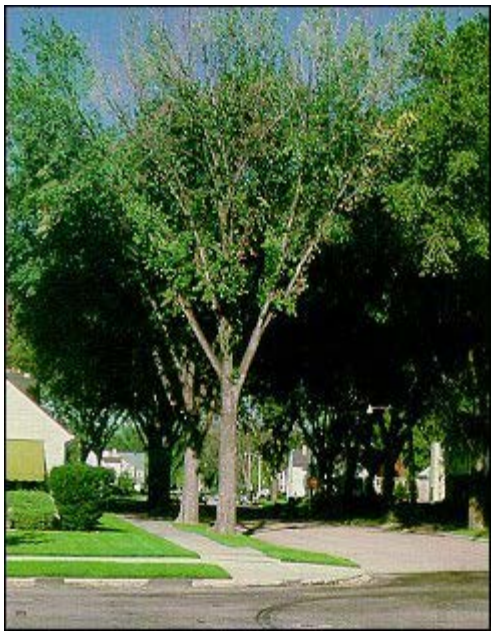

**Figure 4.** Early symptoms of Dutch elm disease in upper crown.

**Elm Phloem Necrosis.** Usually, the entire crown shows symptoms at the same time (Fig. 5). Symptoms appear from July to late September.

**Figure 5.** Early foliar symptom of elm phloem necrosis over entire tree crown.

**Foliage**

**Dutch Elm Disease.** Leaves wilt, turning yellow and then brown. They may remain on infected branches for some time after death.

**Elm Phloem Necrosis.** Leaves turn yellow and may drop prematurely. On trees that survive over winter, leaves in the spring are small and sparse.

**Twigs**

**Dutch Elm Disease.** The wilting branch tip may form a Shepard's Crook. There are streaks of brown discoloration in water-conducting tissues (Fig. 6).

**Figure 6.** Brown discoloration on wood surface of tree infected with Dutch elm disease.

**Elm Phloem Necrosis.** There is no twig wilting. Discoloration is lemon-yellow to butterscotch, and is confined to the inner bark surface (Fig. 7).

**Figure 7.** Discoloration of inner bark surface of tree with elm phloem necrosis.

## Bark and Trunk

**Dutch Elm Disease.** Bark beetle galleries are found between the bark and wood surface in the main trunk or in large branches (Figs. 8-11). Streaks of discoloration are found in all infected parts of trees.

**Figure 8.** Adult of the native elm bark beetle.

**Figure 9.** Brood gallery of native elm bark beetle. Note that galleries are across the wood

grain.

**Elm Phloem Necrosis.** There is a wintergreen odor associated with the discolored area. The odor is more intense when the wood is enclosed in a container. Bark beetle galleries are seldom found. There is discoloration near base of tree. In young trees, this discoloration usually extends into branches.

**Figure 10.** Adult of the smaller European elm bark beetle.

**Figure 10.** Brood gallery of smaller European elm bark beetle. Galleries are in line with wood grain.

## Management Considerations

1. Both diseases can spread quickly from tree to tree, either by insect vectors or through root grafts. Therefore, prompt action is necessary once either disease is diagnosed.

    a. Trees diagnosed as having elm phloem necrosis should be removed promptly because there is no practical chemical control.

    b. Control options are greater for trees infected with Dutch elm disease. A diseased tree of low value should be removed and the roots killed by chemical or mechanical means to prevent the spread to adjacent higher value trees. Affected portions of high value trees can be pruned and a fungicide can be injected into the trunk or branches, or both, to retard the infection Orocess. Specific information on chemical and mechanical control is available in the following publications:

    Allison, J. R., and G. R. Gregory. 1979. How to save Dutch elm diseased trees by pruning. USDA For. Serv. Northeast. Area, State and Priv. For. Publ. NA-GR-9.

    Gregory, Garold F., and James R. Allison. 1979. The comparative effectiveness of pruning versus pruning plus injection of trunk and/or limb fortherapy of DED in American elm. J. Arboric. 5(l):1-4.

2. Report the occurrence of either disease to the local organization responsible for disease control so that appropriate action can be taken.

## Caution

Pesticides used improperly can be injurious to man, animals, and plants. Follow the directions and heed all precautions on the lables.

Store pesticides in original containers under lock and key-out of the reach of children and animals-and away from food and feed.

Apply pesticides so that they do not endanger humans, livestock, crops, beneficial insects, fish, and wildlife. Do not apply pesticides when there is danger of drift, when honey bees or other pollinating insects are visiting plants, or in ways that may contaminate water or leave illegal residues.

Avoid prolonged inhalation of pesticide sprays or dusts; wear protective clothing and equipment if specified on the container.

If your hands become contaminated with a pesticide, do not eat or drink until you have washed. In case a pesticide is swallowed or gets in the eyes, follow the first aid treatment given on the label, and get prompt medical attention. If a pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly.

NOTE: Some States have restrictions on the use of certain pesticides. Check your State and local regulations. Also, because registrations of pesticides are under constant review by the Environmental Protection Agency, consult your local forest pathologist, county agricultural agent, or State Extension specialist to be sure the intended use is still registered.

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